an automatic power controller which latches the power signal in synchronism with the synchronization signal to generate the control signal, and

wherein the synchronization signal is a mirror signal, a gap signal or a clock signal required to drive the disc divided by a ratio into a division signal, and the automatic power controller selectively uses the first through fifth counts as the counted value for the latching of the counted result.

REMARKS

In accordance with the foregoing, the specification and claims 1, 10, 12, 14, 22, 23, 25, 26, 28, 38, 40, 43, 45, 52, and 54-56 have been amended and claims 2-4 and 9 have been cancelled without prejudice or disclaimer. Claims 1, 5-8, 10-57 are pending and under consideration.

1. Examiner's Notes & Remarks

In the Office Action at page 2, the Examiner noted some minor spelling errors. In response, please note that Applicant has made various corrections to address the Examiner's remarks.

2. Objection to the Title

In the Office Action at page 2, the Examiner objected to the title. In response, Applicant has amended the title herein.

3. Claim Objections

In the Office Action at page 3, the Examiner objected to the spelling of the term "up/downcounting." In response to the Examiner's objection, spelling of the term "up/down count" and related terms have been amended.

4. Objection to Claims 33-34 Under 37 CFR § 1.75

In the Office Action at page 3, the Examiner objected to claims 33-34 as being substantially duplicative of claims 31-32, respectively. However, claim 31 recites "averaging a predetermined number of the sampled counted results to determine an average value," while claim 33 recites "averaging the sampled counted results during enablement of the synchronization signal to determine an average value." Thus, claims 31 and 33 have a different scope and the Applicant respectfully requests withdrawal of the objection to claims 33 and 34.

5. Objection to Claims 52, 54, and 55 under 37 CFR 1.75(c)

In the Office Action at page 3, the Examiner objected to claims 52, 54, and 55 as improper dependent claims. Applicant has amended these claims to make appropriate corrections.

6. Rejection of Claims 1-4, 7-11, 24, 38-39, and 42 Under 35 USC § 102 as Anticipated by Suzuki

Claims 1-4, 7-11, 24, 38-39, and 42 were rejected under 35 USC § 102 as anticipated by Suzuki (U.S. Patent No. 6,246,659).

Independent claim 1 recites controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Thus, the invention limits noise susceptibility by using average values so that the controlled power does not change sharply. Application at page 2, lines 28-29, page 5, lines 27-29, page 6, lines 1-4, and see FIGS. 4C-4E.

In the Office Action at page 4, the Examiner stated that Suzuki discloses steps of generating a periodic synchronization signal and controlling the power of the laser diode in synchronism with the synchronization signal.

However, Suzuki fails to describe or suggest controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Instead, Suzuki subtracts a bottom laser light power value from a recording laser light power value to obtain a reference value. Suzuki at col. 6, lines 40-64. Thus, Suzuki does not describe or suggest controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Applicant respectfully requests that claim 1, and claims 2-11 and 22-34, which depend from claim 1, be allowed.

Independent claim 38 describes an apparatus that controls the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. For similar reasons as set forth above with respect to claim 1, it is respectfully requested that claim 38, and claims 39-52, which depend from claim 38 be allowed.

7. Rejection of Claims 35 and 53 Under 35 USC § 102 as Anticipated by Aoki

Claims 35 and 53 were rejected under 35 USC § 102 as anticipated by Aoki (U.S. Patent No. 5,414,692).

Independent claim 35 recites controlling the power of the laser diode only at non-effective data areas of the disc.

In the Office Action at page 6, the Examiner cites Aoki at col. 1, lines 29-52 as anticipating claim 35. However, the cited passage describes a disc format and coding. Thus,

Aoki does not describe or suggest a method that includes controlling the power of the laser diode only at non-effective data areas of the disc. Applicant respectfully requests that claim 35 and claims 36-37, which depend from claim 35, be allowed.

Independent claim 53 recites an apparatus controlling the power of the laser diode only at non-effective data areas of the disc. For the same reasons stated above with respect to claim 35, it is respectfully requested that claim 53 and claims 54-56, which depend from claim 53, be allowed.

8. Rejection of Claims 5-6, 22, 27, 32, 34, 36-37, 41, 48, and 50 Under 35 USC § 103 as Obvious over Suzuki in View of Aoki

Claims 5-6, 22, 27, 32, 34, 36-37, 41, 48, and 50 under 35 USC § 103 as obvious over Suzuki in View of Aoki. Claims 5-6, 22, 27, 32, and 34 depend from independent claim 1, which recites controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode.

In the Office Action at pages 7-8, the Examiner claims that it would have been obvious to provide the system of Suzuki with details of the disc layout taught by Aoki. However, neither Suzuki nor Aoki, either alone or in combination, describe or suggest controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Applicant requests that the claims be allowed.

Claims 36 and 37 depend from claim 35, which recites controlling the power of the laser diode only at non-effective areas of the disc. Neither Suzuki nor Aoki, either alone or in combination, describe or suggest controlling the power of the laser diode only at non-effective areas of the disc. Thus, Applicant respectfully requests allowance of the rejected claims.

Claims 41, 48, and 50 depend from claim 38, which recites an apparatus that controls the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. For the same reasons above with respect to claim 1, Applicant requests allowance of the rejected claims.

9. Rejection of Claims 12-21, 26, 31, 33, 40, 49, and 51 Under 35 USC § 103 as Obvious over Suzuki in View of Hayashi

In the Office Action at pages 9-11, the Examiner rejected claims 12-21, 26, 31, 33, 40, 49, and 51 under 35 USC § 103 as obvious over Suzuki in view of Hayashi (U.S. Patent No. 5,146,240). Claims 26, 31, and 33 depend from claim 1, which recites controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode.

In the Office Action at page 11, the Examiner claims that Hayashi at col. 5, line 10 to

col. 6, line 13, discloses averaging a predetermined number of the sampled counted results to determine an average value and latching the average value. However, the cited passage is silent with respect to a method of controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Instead, Hayashi describes an up/down counter that counts up or down depending on a voltage that is compared to a reference voltage and outputs a signal accordingly. (Hayashi at col. 5, line 10 to col. 6, line 13). Thus, neither Hayashi nor Suzuki, either alone or in combination, describe or suggest a method of controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode.

Independent claim 12 recites an APC controller sampling the counted result from the up/down counter and latching an average of a predetermined number of the sampled counted results in synchronism with a periodic synchronization signal, and outputting the latch result to the laser diode driver. Thus, for similar reasons as discussed above with respect to claim 1, Applicant respectfully requests allowance of claim 12 and claims 13-21, which depend from claim 12.

Claims 40, 49, and 51 depend from claim 38, which recites an apparatus that controls the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. For similar reasons as that set forth above with respect to claim 1, it is respectfully requested that the rejected claims be allowed.

10. Rejection of Claim 23 Under 35 USC § 103 as Obvious over Suzuki in View of Aoki and Hayashi

In the Office Action at pages 9-11, the Examiner rejected claim 23 under 35 USC § 103 as obvious over Suzuki in View of Aoki and Hayashi. Claim 23 depends from claim 1, which recites controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode.

The Examiner argues that it would have been obvious to use the system of Suzuki and Aoki with automatic laser power controlling means taught by Hayashi. However, neither Suzuki, Aoki, nor Hayashi, either alone or in combination, describe or suggest controlling the power of a laser diode in synchronism with the synchronization signal by averaging sampled power levels of the laser diode. Thus, Applicant respectfully requests allowance of the rejected claim.

11. Allowable Subject Matter

In the Office Action at page 13, the Examiner stated that claims 25, 28-30, 43-47, and 56 are objected due but would be allowed if rewritten in independent form. Applicant has

placed the objected to claims in independent form and respectfully requests allowance of the referenced claims.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 6/3/03

By: _____
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please AMEND the Title as follows:

[METHOD AND APPARATUS FOR CONTROLLING POWER SUPPLIED TO LASER DIODE]POWER CONTROL OF LASER DIODE IN AN OPTICAL RECORDING/PLAYBACK APPARATUS

Please AMEND the paragraph on page 11, lines 6-16 with the following:

The LD 160 outputs the power under the control of the LD driver 140, and the PD 202 detects the power level. The detected power level is provided as one input of the first COMP 206a through the VGA 204. If the power level from the LD 160 is higher than the power level which is latched by the latch 216, the decision signal from the first COMP 206a is asserted to a logic low, so that the first up/down counter 208a [downcounts]down counts the decision signal by one. Accordingly, a lower control value is applied to the LD driver 140, and thus the power level from the LD 160 is decreased. Meanwhile, if the power from the LD 160 is lower than the power level which is latched by the latch 216, the decision signal from the first COMP 206a is asserted to a logic high, so that the first up/down counter 208a [upcounts]up counts the decision signal by one. Accordingly, a higher control value is applied to the LD driver 140, thereby raising the power level from the LD 160.

IN THE CLAIMS:

Please CANCEL claims 2, 3, 4, and 9 without prejudice or disclaimer.

Please AMEND the following claims:

1. (Amended) A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

[(a)] generating a periodic synchronization signal; and

[(b)] controlling the power of the laser diode in synchronism with the synchronization signal by:

sampling the difference between the level of the laser light and the reference level to produce a sampled difference,

calculating an average of a predetermined number of the sampled difference to

produce an average compared result, and

controlling the power level of the laser diode according to the average compared result.

2. (Cancelled) The method of claim 1, wherein the step (b) comprises:

(b1) comparing a level of the power of the laser diode with the reference level;

(b2) latching the compared result in response to the synchronization signal; and

(b3) controlling the power level of the laser diode according to the difference between the latched power level and the reference level.

3. (Cancelled) The method of claim 2, wherein in the sub-step (b1), the synchronization signal has a predetermined enable interval, and the power level of the laser diode is latched during the enable interval.

4. (Cancelled) The method of claim 3, wherein the sub-step (b1) further comprises sampling the power level of the laser diode during the enable interval, and latching an average of the sampled power levels.

5. (Original) The method of claim 1, wherein the disc is a digital versatile disc-read only memory (DVD-ROM), and the synchronization signal is a mirror signal indicating a mirror area of the DVD-ROM.

6. (Original) The method of claim 1, wherein the disc is a digital versatile disc-read only memory (DVD-ROM), and the synchronization signal is a gap signal indicating a gap area of the DVD-ROM.

7. (Original) The method of claim 1, wherein the disc is a digital versatile disc-random access memory (DVD-RAM), and the synchronization signal is obtained by dividing a clock signal required to drive the DVD-RAM by a ratio.

8. (Original) The method of claim 7, further comprising varying the division ratio.

9. (Cancelled) The method of claim 1, wherein the step (b) comprises:

(b1) sampling control values designating a level of the power of the laser diode, in synchronism with the synchronization signal;

(b2) calculating an average of a predetermined number of the sampled control values; and

(b3) controlling the power level of the laser diode in accordance with the average of the sampled control values.

10. (Amended) The method of claim [9]1, wherein the synchronization signal is obtained by dividing a clock signal required to drive the disc by a ratio.

11. (Original) The method of claim 10, further comprising varying the division ratio.

12. (Amended) An apparatus for controlling a power of a laser diode emitting laser light on a disc, comprising:

a photo diode which receives the laser light reflected by the disc to generate a current signal corresponding to a level of power of the reflected laser light;

a comparator which outputs an output voltage corresponding to the current signal from the photo diode compares the output voltage with a reference voltage and outputs a binary decision signal which indicates which of the output voltage and the reference voltage is higher;

an up/down counter which up/down counts the binary decision signal in accordance with the comparison result of the comparator to generate a count result;

a laser diode driver which controls a level of the power of the laser diode according to the count result of the up/down counter; and

an automatic power (APC) controller which controls an automatic power control of the laser diode, the APC controller being interposed between the up/down counter and the laser diode driver, the APC controller sampling the counted result from the up/down counter and latching an average of a predetermined number of the sampled counted results [latching the count result of the up/down counter] in synchronism with a periodic synchronization signal, and outputting the latch result to the laser diode driver.

13. (Original) The apparatus of claim 12, wherein the synchronization signal has a predetermined enable interval, and the APC controller latches the counted result from the

up/down counter at an end of the enable interval.

14. (Amended) The apparatus of claim 13, wherein the APC controller samples the counted result from the up/down counter during the enable interval[, and latches an average of a predetermined number of the sampled counted results].

15. (Original) The apparatus of claim 12, wherein the disc is a digital versatile disc-read only memory (DVD-ROM), and the synchronization signal is a mirror signal indicating a mirror area of the DVD-ROM.

16. (Original) The apparatus of claim 12, wherein the disc is a digital versatile disc-read only memory (DVD-ROM), and the synchronization signal is a gap signal indicating a gap area of the DVD-ROM.

17. (Original) The apparatus of claim 12, wherein the disc is a digital versatile disc-random access memory (DVD-RAM), the apparatus further comprising a divider which divides a clock signal required to drive the DVD-RAM by a ratio to generate the synchronization signal.

18. (Original) The apparatus of claim 17, wherein the divider varies the division ratio.

19. (Original) The apparatus of claim 12, wherein the APC controller samples sampling control values designating the power level of the laser diode, in synchronism with the synchronization signal, and latches a predetermined number of the sampled sampling control values.

20. (Original) The apparatus of claim 19, wherein the disc is a digital versatile disc-random access memory (DVD-RAM), the apparatus further comprising a divider which divides a clock signal required to drive the DVD-RAM by a ratio to generate the synchronization signal.

21. (Original) The apparatus of claim 20, wherein the divider varies the division ratio.

22. (Amended) The method of claim 1, wherein the [step (b)]the controlling the power further comprises controlling the power of the laser diode only at non-effective data areas of the disc.

23. (Amended) The method of claim 1, wherein the [step (b)]the controlling the power further comprises generating the synchronization signal selectively in accordance with a sub automatic power control (APC) mode, an average APC mode and a sub-average APC mode for the disc.

24. (Original) The method of claim 1, further comprising:

adjusting the reference level based upon a read mode, a record mode and an erase mode for the disc.

25. (Amended) [The method of claim 24,] A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

generating a periodic synchronization signal;

controlling the power of the laser diode in synchronism with the synchronization signal; and

adjusting the reference level based upon a read mode, a record mode and an erase mode for the disc, wherein the adjusting of the reference level comprises:

adjusting the reference level to a first value if the mode for the disc is the read mode,

adjusting the reference level to a second value if the mode for the disc is the erase mode for lands of the disc,

adjusting the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

adjusting the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc, and

adjusting the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc.

26. (Amended) The method of claim 1, wherein the [step (b)]the controlling the power further comprises:

[comparing a level of the power of the laser diode to the reference level;]

[up/downcounting]up/down counting according to the average compared result to determine a counted result;

latching the counted result in accordance with the synchronization signal, to determine a latched power signal; and

wherein the controlling the power of the laser diode in accordance with the [latched power signal]average compared result further comprises controlling the power of the laser diode in accordance with the latched power signal.

27. (Original) The method of claim 26, wherein the synchronization signal is a mirror or gap signal or a clock signal required to drive the disc divided by a ratio into a division signal.

28. (Amended) [The method of claim 26, wherein] A method of controlling power of a laser diode emitting laser light on a disc by using a difference between a level of the laser light reflected by the disc and a reference level, the difference being detected after the laser light level reflected by the disc is compared with the reference level, the method comprising:

generating a periodic synchronization signal; and

controlling the power of the laser diode in synchronism with the synchronization signal, wherein the controlling the power comprises:

comparing a level of the power of the laser diode to the reference level;

up/down counting according to the compared result to determine a counted result; and

latching the counted result in accordance with the synchronization signal, to determine a latched power signal;

wherein:

the controlling comprises controlling the power of the laser diode in accordance with the latched power signal; and

the up/down counting comprises

up/down counting the counted result to generate a first count in a read mode for the disc,

up/down counting the counted result to generate a second count

in an erase mode of lands of the disc,

up/down counting the counted result to generate a third count in the erase read mode for grooves of the disc,

up/down counting the counted result to generate a fourth count in a record mode of the lands of the disc, and

up/down counting the counted result to generate a fifth count in the record mode for the grooves of the disc, and

selectively using the first through fifth counts as the counted value for the latching of the counted result.

29. (Original) The method of claim 28, further comprising:

multiplexing the second and third counts to generate a first multiplexed signal;

multiplexing the fourth and fifth counts to generate a second multiplexed signal; and

the latching of the counted result comprising selectively latching the first count, the first multiplexed signal and the second multiplexed signal based upon a respective one of the read, erase and record modes of the disc.

30. (Original) The method of claim 29, wherein the latching of the counted result comprises latching the counted result in a period of a mirror or gap signal or a clock signal divided by a ratio into a division signal.

31. (Original) The method of claim 26, wherein the latching of the counted result comprises:

sampling the counted result;

averaging a predetermined number of the sampled counted results to determine an average value; and

latching the average value in accordance with the synchronization signal, to determine the latched power signal.

32. (Original) The method of claim 31, wherein the synchronization signal is a mirror or gap signal or a clock signal divided by a ratio into a division signal.

33. (Original) The method of claim 26, wherein the latching of the counted result

comprises:

sampling the counted result;

averaging the sampled counted results during enablement of the synchronization signal to determine an average value; and

latching the average value in accordance with the synchronization signal, to determine the latched power signal.

34. (Original) The method of claim 33, wherein the synchronization signal is a mirror or gap signal or a clock signal divided by a ratio into a division signal.

35. (Original) A method of controlling power of a laser diode which emits a laser light on a disc, the method comprising:

detecting a level of the power of the laser diode reflected from the disc;

controlling the power of the laser diode only at non-effective data areas of the disc in accordance with the detected power level of the laser diode.

36. (Original) The method of claim 35, wherein the controlling of the power of the laser diode comprises:

comparing the detected power level with a reference signal;

generating a power level signal in accordance with the compared result;

generating a synchronization signal;

latching the power level signal in accordance with the synchronization signal to determine a latched power level signal; and

supplying the latched power level signal to the laser diode to control the power of the laser diode.

37. (Original) The method of claim 36, wherein the synchronization signal is a mirror signal, a gap signal or a clock signal to drive the disc divided by a ratio into a division signal.

38. (Amended) An apparatus for controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal by:

sampling the difference between the level of the laser light and the reference level to produce a sampled difference;

calculating an average of a predetermined number of the sampled difference to produce an average compared result; and

controlling the power level of the laser diode according to the average compared result.

39. (Original) The apparatus of claim 38, wherein the control circuit comprises:

a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode;

power signal circuit which generates a power signal in accordance with the detected power level; and

an automatic power controller which latches the power signal in synchronism with the synchronization signal, to generate the control signal.

40. (Amended) The apparatus of claim 39, wherein the power signal circuit comprises:

a comparator which compares the detected power level of the laser diode with a reference level; and

an up/down counter which [up/downcounts]up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to the automatic power controller.

41. (Original) The apparatus of claim 40, wherein the synchronization signal is a mirror signal, a gap signal or a clock signal required to drive the disc divided by a ratio into a division signal.

42. (Original) The apparatus of claim 40, wherein the power signal circuit further comprises:

a reference value generator which adjusts the reference level based upon a read mode, a record mode and an erase mode for the disc.

43. (Amended) [The apparatus of claim 42, wherein:] An apparatus controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal, the control circuit comprising:

a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode;

a power signal circuit which generates a power signal in accordance with the detected power level, the power signal circuit comprising:

a comparator which compares the detected power level of the laser diode with a reference level; and

an up/down counter which [up/downcounts]up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to the automatic power controller; and

a reference value generator which adjusts the reference level based upon a read mode, a record mode and an erase mode for the disc; and

an automatic power controller which latches the power signal in synchronism with the synchronization signal, to generate the control signal;

wherein, the reference value generator comprises:

a first latch which adjusts the reference level to a first value if the mode for the disc is the read mode,

a second latch which adjusts the reference level to a second value if the mode for the disc is the erase mode for lands of the disc,

a third latch which adjusts the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

a fourth latch which adjusts the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc,

a fifth latch which adjusts the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc; and

a multiplexer which selectively outputs the second through fifth values according to whether a current mode is the erase or record mode and whether a current track is the land or groove; and

the comparator comprises:

a first comparator which compares the first latched value and the detected power level in the read mode, and

a second comparator which compares the second latched value and the detected power level in the erase or record mode.

44. (Original) The apparatus of claim 43, further comprising:

a microcomputer which supplies a first initial reference value to the first latch for adjusting the reference value, a second initial reference value to the second latch for adjusting the reference value, a third initial reference value to the third latch for adjusting the reference value, a fourth initial reference value to the fourth latch for adjusting the reference value, and a fifth initial reference value to the fifth latch for adjusting the reference value.

45. (Amended) [The apparatus of claim 40, wherein:] An apparatus for controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal, the control circuit comprising:

a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode;

a power signal circuit which generates a power signal in accordance with the detected power level, the power signal circuit comprising:

a comparator which compares the detected power level of the laser diode with a reference level; and

an up/down counter which up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to the automatic power controller; and

an automatic power controller which latches the power signal in synchronism with the synchronization signal, to generate the control signal;

wherein the up/down counter comprises:

a first [up/downcounter]up/down counter which [up/downcounts]up/down counts the counted result to generate a first count in a read mode for the disc,

a second [up/downcounter] up/down counter which [up/downcounts] up/down counts the counted result to generate a second count in an erase mode of lands of the

disc,

a third [up/downcounter] up/down counter which [up/downcounts] up/down counts the counted result to generate a third count in the erase read mode for grooves of the disc,

a fourth [up/downcounter] up/down counter which [up/downcounts] up/down counts the counted result to generate a fourth count in a record mode of the lands of the disc, and

a fifth [up/downcounter]up/down counter which [up/downcounts] up/down counts the counted result to generate a fifth count in the record mode for the grooves of the disc; and

the automatic power controller selectively uses the first through fifth counts as the counted value for the latching of the counted result.

46. (Original) The apparatus of claim 45, wherein the power signal circuit further comprises:

a first multiplexer which multiplexes the second and third counts to generate a first multiplexed signal; and

a second multiplexer which multiplexes the fourth and fifth counts to generate a second multiplexed signal;

wherein the automatic power controller selectively latches the first count, the first multiplexed signal and the second multiplexed signal based upon a respective one of the read, erase and record modes of the disc.

47. (Original) The apparatus of claim 46, wherein the synchronization signal is a mirror signal, a gap signal or a clock signal to drive the disc divided by a ratio into a division signal.

48. (Original) The apparatus of claim 40, wherein the automatic power controller latches the counted result in a period of a mirror or gap signal or a clock signal divided by a ratio into a division signal.

49. (Original) The apparatus of claim 40, wherein the automatic power controller samples the counted result, averages a predetermined number of the sampled counted results to determine an average value, and latches the average value in accordance with the

synchronization signal, to determine the control signal.

50. (Original) The apparatus of claim 49, wherein the synchronization signal is a mirror or gap signal or a clock signal divided by a ratio into a division signal.

51. (Original) The apparatus of claim 40, wherein the automatic power controller samples the counted result, averages the sampled counted results during enablement of the synchronization signal to determine an average value, and latches the average value in accordance with the synchronization signal, to determine the control signal.

52. (Amended) The [method]apparatus of claim 51, wherein the synchronization signal is a mirror or gap signal or a clock signal divided by a ratio into a division signal.

53. (Original) An apparatus for controlling power of a laser diode which emits a laser light on a disc, the apparatus comprising:

a detector which detects a level of the power of the laser diode reflected from the disc;

a control circuit which controls the power of the laser diode only at non-effective data areas of the disc in accordance with the detected power level of the laser diode.

54. (Amended) The [method]apparatus of claim 53, wherein the control circuit comprises:

a comparator which compares the detected power level with a reference signal;

a power level generator which generates a power level signal in accordance with the output of the comparator;

an automatic power controller which latches the power level signal in accordance with a synchronization signal to determine a latched power level signal; and

a laser diode driver which supplies the latched power level signal to the laser diode to control the power of the laser diode.

55. (Amended) The [method]apparatus of claim 54, wherein the synchronization signal is a mirror signal, a gap signal or a clock signal to drive the disc divided by a ratio into a division signal.

56. (Amended) An apparatus for controlling a power of a laser diode emitting light on a disc, the apparatus comprising:

a laser driver which controls the power of the laser diode in accordance with a control signal; and

a control circuit which generates the control signal in synchronism with a periodic synchronization signal, wherein the control circuit comprises:

a detector which detects the light reflected from the disc, to generate a detected power level of the laser diode,

a power signal circuit which generates a power signal in accordance with the detected power level wherein the power signal circuit comprises:

a comparator which compares the detected power level of the laser diode with a reference level, wherein the comparator comprises:

a first comparator which compares the first latched value and the detected power level in the read mode, and

a second comparator which compares the second latched value and the detected power level in the erase or record mode,

an up/down counter which up/down counts according to the output of the comparator to determine a counted result, wherein the counted result is input as the power signal to an automatic power controller, [The apparatus of claim 43, wherein] the up/down counter comprising:

a first [up/downcounter]up/down counter which [up/downcounts]up/down counts according to the output from the first comparator to generate a first count in a read mode for the disc,

a second [up/downcounter]up/down counter which [up/downcounts]up/down counts according to the output from the second comparator to generate a second count in an erase mode of lands of the disc,

a third [up/downcounter]up/down counter which [up/downcounts]up/down counts according to the output from the second comparator to generate a third count in the erase read mode for grooves of the disc,

a fourth [up/downcounter]up/down counter which [up/downcounts]up/down counts according to the output from the second comparator to generate a fourth count in a record mode of the lands of the disc, and

a fifth fourth [up/downcounter]up/down counter which fourth [up/downcounts] up/down counts according to the output from the second comparator to

generate a fifth count in the record mode for the grooves of the disc; and

a reference value generator which adjusts the reference level based upon a read mode, a record mode and an erase mode for the disc wherein, wherein the reference value generator comprises:

a first latch which adjusts the reference level to a first value if the mode for the disc is the read mode,

a second latch which adjusts the reference level to a second value if the mode for the disc is the erase mode for lands of the disc,

a third latch which adjusts the reference level to a third value if the mode for the disc is the erase mode for grooves of the disc,

a fourth latch which adjusts the reference level to a fourth value if the mode for the disc is the record mode for the lands of the disc,

a fifth latch which adjusts the reference level to a fifth value if the mode for the disc is the record mode for the grooves of the disc, and

a multiplexer which selectively outputs the second through fifth values according to whether a current mode is the erase or record mode and whether a current track is the land or groove,

an automatic power controller which latches the power signal in synchronism with the synchronization signal to generate the control signal, and

wherein the synchronization signal is a mirror signal, a gap signal or a clock signal required to drive the disc divided by a ratio into a division signal, and the automatic power controller selectively uses the first through fifth counts as the counted value for the latching of the counted result.

57. (Original) An apparatus for controlling power of a laser diode which emits a laser light on a disc, the apparatus comprising:

a detector which detects a level of the power of the laser diode reflected from the disc;

a control circuit which controls the power of the laser diode based upon a sub automatic power controller mode, an average automatic power controller mode, and a sub-average automatic power controller mode and in accordance with the detected power level of the laser diode.